

使用邊界指標辨識及評估容積實體的形狀特徵

Feature Recognition and Evaluation of Volumetric Solid Using Boundary Pointers

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摘要

本論文提出一辨識及評估容積實體之形狀特徵的方法。我們在每一容積素上使用邊界指標去記錄邊界，藉此容易地獲得實體在每一容積列的範圍。藉由比較鄰近列的實體範圍，我們的演算法可辨識凹、凸、洞、海峽、分離等形狀特徵，也評估一些有用的特性如特徵的寬及厚度和特徵間的實體厚度。我們也發展切割、分裂、結合、和移動等容積實體演算中維持邊界指標一致性的演算法。所以也可辨識及評估演算後的形狀特徵。而我們用一醫學臨床例：脊椎骨折來展示我們的方法可辨識脊椎骨的各项特徵，及評估有用於脊椎骨折的診斷及手術計劃的特徵特性。

Abstract

This paper proposes a feature recognition and evaluation method for volumetric solids. Two boundary pointers on each voxel record solid boundaries, thus the extents of a solid along every voxel row can be easily obtained using the pointers. We develop feature recognition algorithms to extract the convex, concave, hole, strait and separate features on a volumetric solid by comparing the solid extents of neighboring voxel rows. Useful properties such as the thickness and width of a feature and the solid thickness of inter-features are evaluated. We also develop algorithms to maintain the consistencies of the boundary pointers during volume manipulations including the cut, tear, join and reposition on a volumetric solid, thus the feature recognitions and evaluations are effective for the manipulated solid. A fracture spine clinical example demonstrates the feasibility of this method in recognizing various features of the spinal bone and evaluating useful feature properties for the diagnosis and surgical planning of the fracture spine.